

Serial No. 09/\_\_\_\_\_ "CHEMICAL DERIVATIZATION OF SINGLE-WALL CARBON NANOTUBES TO FACILITATE SOLVATION THEREOF; AND USE OF DERIVATIZED NANOTUBES TO FORM CATALYST-CONTAINING SEED MATERIALS FOR USE IN MAKING CARBON FIBERS" to Margraves et al., (Attorney Docket No. 11321-P028US), filed concurrent to the date of this Application; and

Serial No. 09/\_\_\_\_\_ "CHEMICAL DERIVATIZATION OF SINGLE-WALL CARBON NANOTUBES TO FACILITATE SOLVATION THEREOF; AND USE OF DERIVATIZED NANOTUBES TO FORM CATALYST-CONTAINING SEED MATERIALS FOR USE IN MAKING CARBON FIBERS" to Margraves et al., (Attorney Docket No. 11321-P029US), filed concurrent to the date of this Application.

IN THE CLAIMS:

Please delete claims 1-51 without prejudice or disclaimer.

Please add new claims 52-96 listed below.

1 52. (New) A single wall carbon nanotube having one or more substituents covalently  
2 bonded to a sidewall of the single wall carbon nanotube.

1 53. (New) The single wall carbon nanotube of claim 52, wherein the substituents are  
2 selected from the group consisting of alkyl, acyl, aryl, aralkyl, halogen, substituted thiol,  
3 unsubstituted thiol, substituted amino, unsubstituted amino, hydroxy, and OR', wherein R' is selected  
4 from the group consisting of hydrogen, alkyl, acyl, aryl, aralkyl, halogen, substituted thiol,  
5 unsubstituted thiol, substituted amino, unsubstituted amino, a linear carbon chain, and a cyclic  
6 carbon chain.

1 54. (New) The single wall carbon nanotube of claim 53, wherein the linear carbon chain  
2 or the cyclic carbon chain or both is substituted with at least one heteroatom.

1 55. (New) The single wall carbon nanotube of claim 53, wherein the linear carbon chain  
2 or the cyclic carbon chain or both is substituted with one or more of the group consisting of =O, =S,  
3 hydroxy, an aminoalkyl, an amino acid, and a peptide of 2-8 amino acids.

1 56. (New) The single wall carbon nanotube of claim 52, wherein the substituents are  
2 alkyl or phenyl.

1 57. (New) The single wall carbon nanotube of claim 52, further comprising metal  
2 complexed to at least one of the substituents.

1 58. (New) The single wall carbon nanotube of claim 57, wherein the metal is selected  
2 from the group consisting of Group VI B metals and Group VIII B metals.

1 59. (New) The single wall carbon nanotube of claim 52, wherein the amount of  
2 substituent bonded to carbon atoms of the single wall carbon nanotube is at a substituent to carbon  
3 ratio of from (a) one substituent to about 26 carbon atoms to (b) one substituent to about two carbon  
4 atoms.

1 60. (New) The single wall carbon nanotube of claim 59, wherein the amount of  
2 substituent bonded to the carbon atoms of the single wall carbon nanotube is at a substituent to  
3 carbon ratio of from (a) one substituent to about ten carbon atoms to (b) one substituent to about two  
4 carbon atoms.

1 61. (New) The single wall carbon nanotube of claim 60, wherein the amount of  
2 substituent bonded to the carbon atoms of the single wall carbon nanotube is at the substituent to  
3 carbon ratio of from (a) one substituent to about three carbon atoms to (b) one substituent to about  
4 two carbon atoms.

1 62. (New) A product made by the process of covalently bonding substituents to carbon  
2 atoms on a sidewall of the single wall carbon nanotube.

1 63. (New) The product of claim 62, wherein the substituents are selected from the group  
2 consisting of alkyl, acyl, aryl, aralkyl, halogen, substituted thiol, unsubstituted thiol, substituted  
3 amino, unsubstituted amino, hydroxy, and OR', wherein R' is selected from the group consisting of  
4 hydrogen, alkyl, acyl, aryl, aralkyl, halogen, substituted thiol, unsubstituted thiol, substituted amino,  
5 unsubstituted amino, a linear carbon chain, and a cyclic carbon chain.

1 64. (New) The product of claim 63, wherein the linear carbon chain or the cyclic carbon  
2 chain or both is substituted with at least one heteroatom.

1 65. (New) The product of claim 63, wherein the linear carbon chain or the cyclic carbon  
2 chain or both is substituted with one or more of the group consisting of =O, =S, hydroxy, an  
3 aminoalkyl, an amino acid, and a peptide of 2-8 amino acids.

1 66. (New) The product of claim 62, wherein the substituents are selected from the group  
2 consisting of fluorine, alkyl and phenyl.

1 67. (New) The product of claim 62, further comprising the step of complexing a metal  
2 to at least one of the substituents.

1 68. (New) The product of claim 67, wherein the metal is selected from the group  
2 consisting of Group V I B metals and Group VIII B metals.

1 69. (New) The product of claim 62, wherein the amount of substituent bonded to carbon  
2 atoms of the single wall carbon nanotube is at a substituent to carbon ratio of from (a) one  
3 substituent to about 26 carbon atoms to (b) one substituent to about two carbon atoms.

1 70. (New) The product of claim 69, wherein the amount of substituent bonded to the  
2 carbon atoms of the single wall carbon nanotube is at the substituent to carbon ratio of from (a) one  
3 substituent to about ten carbon atoms to (b) one substituent to about two carbon atoms.

1 71. (New) The product of claim 70, wherein the amount of substituent bonded to the  
2 carbon atoms of the single wall carbon nanotube is at the substituent to carbon ratio of from (a) one  
3 substituent to about three carbon atoms to (b) one substituent to about two carbon atoms.

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1 72. (New) A product made by the process comprising:

2 (a) fluorinating a single wall carbon nanotube;

3 (b) reacting the fluorinated single wall carbon nanotube with a compound containing  
4 a substituent to covalently bond the substituents to the single wall carbon nanotube.

1 73. (New) The product of claim 72, wherein the substituents are selected from the group  
2 consisting of alkyl, acyl, aryl, aralkyl, halogen, substituted thiol, unsubstituted thiol, substituted  
3 amino, unsubstituted amino, hydroxy, and OR', a linear carbon chain, a cyclic carbon chain, and  
4 peptide, wherein R' is selected from the group consisting of hydrogen, alkyl, acyl, aryl, aralkyl,  
5 halogen, substituted thiol, unsubstituted thiol, substituted amino, unsubstituted amino, a linear  
6 carbon chain, and a cyclic carbon chain.

1 74. (New) The product of claim 73, wherein the linear carbon chain or the cyclic carbon  
2 chain or both is substituted with at least one heteroatom.

1 75. (New) The product of claim 73, wherein the linear carbon chain or the cyclic carbon  
2 chain or both is substituted with one or more of the group consisting of =O, =S, hydroxy, an  
3 aminoalkyl, an amino acid, and a peptide of 2-8 amino acids.

1 76. (New) The product of claim 72, wherein the substituents are alkyl or phenyl.

1 77. (New) The product of claim 72 made by the process further comprising the step of  
2 complexing a metal to at least one of the substituents.

1 78. (New) The product of claim 77, wherein the metal is selected from the group  
2 consisting of Group VI B metals and Group VIII B metals.

1 79. (New) The product of claim 72, wherein the amount of substituent bonded to carbon  
2 atoms of the single wall carbon nanotube is at a substituent to carbon ratio of from (a) one  
3 substituent to about 26 carbon atoms to (b) one substituent to about two carbon atoms.

1           80.   (New) The product of claim 79, wherein the amount of substituent bonded to the  
2 carbon atoms of the single wall carbon nanotube is at the substituent to carbon ratio of from (a) one  
3 substituent to about ten carbon atoms to (b) one substituent to about two carbon atoms.

1           81.   (New) The product of claim 80, wherein the amount of substituent bonded to the  
2 carbon atoms of the single wall carbon nanotube is at the substituent to carbon ratio of from (a) one  
3 substituent to about three carbon atoms to (b) one substituent to about two carbon atoms.

1           82.   (New) The product of claim 72, wherein said step of fluorinating the single wall  
2 carbon nanotube comprises exposing the single wall carbon nanotube to a fluorinating agent.

1           83.   (New) The product of claim 82, wherein the fluorinating agent is selected from the  
2 group consisting of fluorine,  $\text{ClF}_3$ ,  $\text{BrF}_3$ ,  $\text{IF}_5$ ,  $\text{XeF}_2$ ,  $\text{XeF}_4$ ,  $\text{AgF}_2$ , and  $\text{MnF}_3$ .

1           84.   (New) The product of claim 82, wherein the fluorinating step occurs at a reaction  
2 temperature up to about  $500^\circ\text{C}$ .

1           85.   (New) The product of claim 82, wherein the reaction temperature is between about  
2  $250^\circ\text{C}$  and about  $400^\circ\text{C}$ .

1 86. (New) A derivatized single wall carbon nanotube made by the process comprising the  
2 steps of:

- 3 (a) reacting the single wall carbon nanotube with a fluorinating agent;
- 4 (b) solvating the single wall carbon nanotube from step (i); and
- 5 (c) reacting the fluorinated single wall carbon nanotube with a compound containing  
6 a substituent to covalently bond the substituent to the single wall carbon nanotube.

1 87. (New) The derivatized single wall carbon nanotube of claim 86, wherein the  
2 substituents are selected from the group consisting of alkyl, acyl, aryl, aralkyl, halogen, substituted  
3 thiol, unsubstituted thiol, substituted amino, unsubstituted amino, hydroxy, and OR', wherein R' is  
4 selected from the group consisting of hydrogen, alkyl, acyl, aryl, aralkyl, halogen, substituted thiol,  
5 unsubstituted thiol, substituted amino, unsubstituted amino, a linear carbon chain, and a cyclic  
6 carbon chain.

1 88. (New) The derivatized single wall carbon nanotube of claim 87, wherein the linear  
2 carbon chain or the cyclic carbon chain or both is substituted with at least one heteroatom.

1 89. (New) The derivatized single wall carbon nanotube of claim 87, wherein the linear  
2 carbon chain or the cyclic carbon chain or both is substituted with one or more of the group  
3 consisting of =O, =S, hydroxy, an aminoalkyl, an amino acid, and a peptide of 2-8 amino acids.

1 90. (New) The derivatized single wall carbon nanotube of claim 86, wherein the  
2 fluorinating agent is selected from the group consisting of fluorine, ClF<sub>3</sub>, BrF<sub>3</sub>, IF<sub>5</sub>, XeF<sub>2</sub>, XeF<sub>4</sub>,  
3 AgF<sub>2</sub>, and MnF<sub>3</sub>.

1 91. (New) The derivatized single wall carbon nanotube of claim 86, wherein the solvation  
2 step comprises sonication.

1           92.   (New) The derivatized single wall carbon nanotube of claim 86, wherein the solvation  
2 step comprises using a solvent selected from the group consisting of an alcohol,  $\text{CHCl}_3$ , and  
3 dimethylformamide.

1           93.   (New) The derivatized single wall carbon nanotubes of claim 92, wherein the alcohol  
2 is selected from the group consisting of methanol, ethanol, 2,2,2-trifluoroethanol, 2-propanol,  
3 2-butanol, n-pentanol, n-hexanol, cyclohexanol and n-heptanol.

1           94.   (New) The derivatized single wall carbon nanotube of claim 86, wherein the amount  
2 of substituent bonded to carbon atoms of the single wall carbon nanotube is at a substituent to carbon  
3 ratio of from (a) one substituent to about 26 carbon atoms to (b) one substituent to about two carbon  
4 atoms.

1           95.   (New) The derivatized single wall carbon nanotube of claim 94, wherein the amount  
2 of substituent bonded to the carbon atoms of the single wall carbon nanotube is at a substituent to  
3 carbon ratio of from (a) one substituent to about ten carbon atoms to (b) one substituent to about two  
4 carbon atoms.

1           96.   (New) The derivatized single wall carbon nanotube of claim 95, wherein the amount  
2 of substituent bonded to the carbon atoms of the single wall carbon nanotube is at the substituent to  
3 carbon ratio of from (a) one substituent to about three carbon atoms to (b) one substituent to about  
4 two carbon atoms.